SOUTHWEST FISHERIES SCIENCE CENTER
THIRD QUARTER REPORT-FY 2001
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SUBMITTED BY: Lab Director/Division Director/Group Chief: John Hunter, Division Director, Fisheries Division.

Title of Accomplishment or Milestone: Stock assessment for north Pacific albacore: (**1**) develop/review critical time series necessary for conducting length/age-structured assessments of the stock using relatively simple, deterministic modeling (e.g., Virtual Population Analysis); and (**2**) develop a statistical model that can address multiple hypotheses regarding estimated biological distributions and account for migratory habits of the stock (e.g., AD MODEL BUILDER/MULTIFAN-CL software platform).

Current Status of Accomplishment or Milestone: (**1**) Critical time series were developed and included in the assessment efforts (tuned-VPA model) carried out at the *Seventeenth North Pacific Albacore Workshop* (NPALBW) held in Taipei, Taiwan (December 2000); and (**2**) a 'prototype' MULTIFAN-CL model for the stock is well underway (i.e., data-set preparation and time series evaluations are nearly completed), with baseline modeling runs scheduled for late summer/early fall.

Background: Recently, members of the NPALBW recognized that efforts need to be started regarding development of population-wide assessments for the albacore population of the North Pacific Ocean, given the annual migratory behavior of the stock necessarily confounds straightforward interpretations of the available sample data that have been collected by the various countries targeting this species. Length/age-structured assessment approaches, including both deterministic and statistical models, were recommended as important research areas. Tasks inherently involved in such research would include, rigorous examination of available sample data, consensus regarding important assumptions and construction of important time series used in the models, general and detailed treatment of the data during the modeling stages, and finally, summarizations of the substantial amount of results generated from the modeling efforts (e.g., sensitivity runs and profiles of important fishery parameters).

Purpose of Activity: To improve our understanding of the stock dynamics of the albacore population and ultimately, to provide accurate estimates of important fishery parameters needed to manage the stock in sustainable terms, including historical and current estimates of adult biomass, spawning stock biomass, recruitment, and fishing mortality rates.

Description of Accomplishment (e.g., to the Center, to Management, and to NMFS Strategic Plan Goals) and significant results: Work aimed at deriving important time series (e.g., size/age distributions and 'standardized' indices of catch-per-unit-effort, both age-aggregated and age-specific) was successful and allowed general modeling efforts to be carried out. For example, results from VPA-based modeling indicate that albacore stock biomass remained relatively stable from 1975 through the late 1980s (roughly 400,000-500,000 mt) and then began to increase markedly through the 1990s, reaching a current estimate of roughly 1 million mt. Reasons attributed to this finding include increased recruitment, coupled with favorable oceanographic conditions and sustainable levels of fishing pressure, which collectively, have supported increases in population levels. Independent review of indices of stock abundance from fishermen logbook data also indicate stock size has increased over the last decade. However, further work using more complex, statistical modeling approaches will provide additional benefits, given: (1) qualitative decisions regarding treatment of the sample data are inherently involved in general modeling approaches, such as VPA (e.g., coalescing data collected in independent sampling programs into a single catch-at-age matrix and decisions regarding terminal levels of fishing mortality) and more importantly, (2) robust maximum-likelihood based estimation methods will allow the variability surrounding the estimates to be objectively evaluated.
Significance of Accomplishment: Research aimed at producing more accurate stock assessments for

north Pacific albacore will directly benefit management, particularly, the current efforts underway by the international convention (*Multilateral High-level Conference (MHLC) on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean*) that has been convened to establish management frameworks for the highly migratory stocks of the Pacific Ocean. It is imperative that the uncertainty inherent in the overall assessment process is rigorously evaluated, given this variability is a critical factor when developing management advice based on scientific analyses.

Problems: Construction of important time series has been problematic, given sample data are sparse for certain fisheries and have been collected opportunistically (vs. systematically) at times in some of the fisheries. As expected, developing a baseline model within the MULTIFAN-CL programming environment has been tedious, given the complex structure of the modeling platform.

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